

REMARKS

Claims 1-30 are currently pending in the application. By this amendment, claims 1, 7, 14 and 20 are amended. The above amendments do not add new matter to the application and are fully supported by the specification. For example, support for the amendment to claims 1 and 14 can be found at paragraphs [0020] and [0055] of the specification. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Allowable Claims

Applicants appreciate the indication that claims 7-11, 20-24 and 29 contain allowable subject matter. Applicants note that because claims 7 and 20 have been presented in independent form, claims 7-11 and 20-24 should now be indicated as being allowed. Claim 29 is not being presented in independent form at this time because claim 27, from which it depends, is believed to be allowable. Furthermore, Applicants submit that all of the pending claims are in condition for allowance and that the rejection under 102 should be withdrawn.

35 U.S.C. § 102(a) Rejection

Claims 1-6, 12-19, 25-28 and 30 were rejected under 35 U.S.C. § 102(a) as being anticipated by the Article entitled "Statistical Delay Computation Considering Spatial Correlations" by Aseem AGARWAL et al. This rejection is respectfully traversed.

In order to establish a *prima facie* case of anticipation under 35 U.S.C. § 102, a single prior art reference must disclose each and every element as set forth in the subject claim. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). Applicants respectfully submit that a *prima facie* case of anticipation has not been established as the applied reference fails to teach each and every element of the claims.

More particularly, independent claims 1 and 14 recite, *inter alia*,

computing a timing slack variation for the timing test using the at least one location information,
wherein the one or more inputs comprise cells or elements of interest.

Furthermore, independent claim 27 recites, *inter alia*,

determining a timing slack variation in the early path using location information on one or more elements in the early path;

determining a timing slack variation in the late path using location information on one or more elements in the late path; and

computing a new timing slack for the early path and the late path by using the timing slack variation in the early path and the timing slack variation in the late path.

The applied reference does not teach at least these features.

Applicants acknowledge that AGARWAL discloses a statistical timing analysis for a circuit path (see page 272, left col., 2nd full para.). Applicants also acknowledge that AGARWAL accounts for spatial correlation (see page 272, right col., 2nd full para.). However, it is not apparent that AGARWAL discloses, or even suggests, computing a timing slack variation for the timing test using at least one location information, where the one or more inputs comprise cells or elements of interest. Indeed, the Examiner

has failed to identify any language in AGARWAL with regard to, e.g., timing slack variation. Applicants note, for example, that the language in section 4 discussing the analysis of spatial correlations is directed to computing intra-die length correlation. This language lacks any discussion with regard to the claimed features.

Moreover, while the Examiner has alleged that AGARWAL discloses determining a timing slack variation in the early path using location information on one or more elements in the early path, determining a timing slack variation in the late path using location information on one or more elements in the late path, and computing a new timing slack for the early path and the late path by using the timing slack variation in the early path and the timing slack variation in the late path, the Examiner has failed to identify any specific language in this document in support of such assertions.

Applicants note, for example, that the left col., last paragraph of page 274 merely discloses the partitioning the die into areas and associating a random variable thereto. Furthermore, contrary to the Examiner's assertions, the left col., first paragraph of page 275 merely discloses the spatial correlation of certain regions and is entirely silent with regard to either determining a timing slack variation in the early path using location information on one or more elements in the early path or determining a timing slack variation in the late path using location information on one or more elements in the late path. Finally, Applicants submit that the language in the middle of left column on page 275 merely discloses the summing up of certain equations which account for the spatial correlation does not constitute disclosure sufficient to disclose or suggest computing a

new timing slack for the early path and the late path by using the timing slack variation in the early path and the timing slack variation in the late path.

Applicants emphasize that whereas AGARWAL gathers information for individual delay elements along a particular path to a timing test, the invention, by way of example, gathers information for the entire cone feeding the timing test. Thus AGARWAL gathers a different collection of location information for each path to the timing test, whereas the invention gathers one such collection.

Furthermore, dependent claims 2-6, 12, 13, 15-19, 25, 26, 28 and 30 recite additional features which are not disclosed, or even suggested, by AGARWAL and the Examiner has not shown otherwise.

For example, AGARWAL clearly fails to disclose the logic cones of claims 2 and 15, the bounding regions recited in claims 3-6, 16-19 and 28, and the abstract locations of claims 12, 13, 25 and 26. In particular, whereas AGARWAL teaches gathering information for a path, it is not correct that AGARWAL teaches gathering one set of information for the entire input cone. Furthermore, although the cone is comprised of multiple paths, there is overlap between the paths, so that the total amount of location information needed to separately cover each path in the cone can be exponentially large. AGARWAL also does not teach how to avoid this exponential explosion of information. The Examiner also appears to confuse bounds which AGARWAL shows in Fig. 1 to contain the delay of a single element in the input cone or path to a test with the inventive bounds which contain the entire path or cone. Since the regions of AGARWAL are formed by a predetermined partitioning of the chip area, they do not provide a

bound which is appropriate to a particular path or cone. Furthermore, AGARWAL uses a predetermined set of location bounds, with each gate falling into a set of these bounds. As these bounds are predetermined regions, and they do not move circuits, they clearly do not modify the bounds applied to any gate. However, as mentioned above, their bounds apply to individual gates and not the test input as a whole. Still further, AGARWAL determines slack (or more precisely, delay) variation factors based on the size of regions, these are not bounding regions in the sense recited in Applicants' invention. Additionally, although the location information (regions) of AGARWAL can be considered abstract (it is not a precise gate location), according to the invention, abstract location information means information that is unrelated to actual physical location on a chip. The regions of AGARWAL are not abstract in this sense. It is also apparent that the delta delay information associated with each region in AGARWAL is based on spatial correlation of parameters which affect delay. It is not related to the correlation of the delay functions themselves. In other words, they determine locations and from that determine delta delay. The invention, on the other hand, looks at delta delay (from different delay equations) and from that determine an abstract distance (difference in abstract location information) between two gates. s related to the different sense in which we mean an "abstract" location information. It is also clear that AGARWAL is silent with regard to early and late paths.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 102(a) should be withdrawn.

Comments on Reasons for Allowance

In response to the Statement of Reasons for Allowance set forth in the Office Action, Applicants wish to clarify the record with respect to the basis for the patentability of the indicated claims in the present application. In this regard, while Applicants do not disagree with the Examiner's indication that certain identified features are not disclosed by the references, Applicants submit that the claims in the present application recite a combination of features, and that the basis for patentability of these claims is based on the totality of the recited features.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Deposit Account No. 09-0456.

Respectfully submitted,
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